What is claimed is:

1. A method for forming a porous film comprising the steps of:

applying a film-forming composition containing a polysiloxane, a pore-forming agent, an onium salt, and a solvent onto a substrate,

subjecting a first heat-treatment for evaporating said solvent from said film-forming composition,

subjecting a second heat-treatment for promoting the polymerization of said polysiloxane in an inert-gas atmosphere, and

subjecting a third heat-treatment for vaporizing said pore-forming agent in an oxidizing-gas atmosphere.

2. The method for forming a porous film according to claim 1, wherein said first heat-treatment is carried out in an inert-gas atmosphere at a temperature of 350°C or below.

3. The method for forming a porous film according to claim 1, wherein said second heat-treatment is carried out at a temperature of 400°C or below.

4. The method for forming a porous film according to claim 1, wherein said second heat-treatment is carried out at a temperature of 350°C or below.

5. The method for forming a porous film according to claim 1, wherein said third heat-treatment is carried out at a temperature equal to or lower than the temperature in said second heat-treatment.

6. The method for forming a porous film according to claim 1, wherein said oxidizing gas is oxygen gas.

7. The method for forming a porous film according to claim 6, wherein said oxygen gas contains ozone or oxygen radicals.

8. The method for forming a porous film according to claim 1, wherein said polysiloxane is a hydrolytic condensation product of a compound represented by the general formula (1):

[Formula 1]

$$R_nSiX_{4-n} \cdots\cdots (1)$$

wherein R represents a hydrogen atom, or an organic group having from 1 to 20 carbon atoms, X represents a hydrolysable group which may be the same as or different from each other, and n represents an integer from 0 to 2, with the proviso that when n is 2, R may be the same or different moieties.

9. The method for forming a porous film according to claim 8, wherein the weight-average molecular weight of said polysiloxane ranges from 300 to 20,000.

10. The method for forming a porous film according to claim 1, wherein said pore-forming agent is a polymer having an alkylene-oxide structure with a weight-average molecular weight of from 200 to 10,000.

11. The method for forming a porous film according to claim 1, wherein said onium salt is an ammonium salt.

12. The method for forming a porous film according to claim 1, wherein said solvent is an alkylene glycol dialkyl ether or a dialkylene glycol dialkyl ether.

13. The method for forming a porous film according to claim 1, wherein said substrate is a semiconductor substrate.